CLAIMS

1. A process for producing oils with a high viscosity index from a feed containing constituents with boiling points of more than about 300°C, characterized in that:

   a) hydrogen is reacted with the feed or with a mixture of the feed with at least a fraction of a stream recycled from step c), in the presence of a catalyst comprising at least one amorphous non zeolitic matrix and at least one metal or compound of a metal from group VIII of the periodic table and/or at least one metal from group VIB;

   b) at least a portion of the effluent obtained from step a) is fractionated so as to separate at least one oil residue comprising mainly constituents with viscosity indices which are higher than that of the feed;

   c) at least a portion of the oil residue obtained in step b) is fractionated by thermal diffusion into oil fractions with high viscosity indices, the process also being characterized in that the oils are separated in accordance with their viscosity index.

2. A process according to claim 1, in which step b) is preceded by a step d) for bringing at least a portion of the effluent obtained in step a) into contact with hydrogen in the presence of a catalyst comprising at least one zeolite, at least one matrix, and at least one metal or compound of a metal from group VIII of the periodic table and/or at least one group VIB metal, the effluent obtained from step d) being sent to step c).

~~3. A process according to claim 1 or claim 2, in which the effluent obtained from step a) or step d) is fractionated in at least one separator, into at least one gaseous effluent which is evacuated and into at least one liquid effluent which is sent to step b).~~

4. A process according to ~~any one of~~ claims ~~1 to 3~~ 2, in which at least a portion of the unconverted fractions recovered in steps a) or d) are recycled either to step a) or to step d) or partially to both of said steps.

5. A process according to ~~any one of~~ claims ~~1 to 4~~ 2, in which the recycle streams from step c) are fractions from step c) with low viscosity indices, which are recycled either to step a) or to step d) or partially to both said steps.

6. A process according to ~~any one of~~ claim~~s 1 to 5~~ 4, in which the oil residue obtained in step b) and/or ~~the~~ non recycled fractions extracted from step c) are dewaxed with a catalyst or a solvent, the paraffins from this dewaxing step being recycled either to step a) or to step d) or partially to both said steps.

7. A process according to ~~any one of~~ claim~~s~~ 1 ~~to 6,~~ in which the matrix for the catalyst of step a) is selected from the group ~~formed by~~ consisting of alumina, silica, silica-aluminas, magnesia, clays and mixtures of at least two of said minerals.

8. A process according to ~~any one of~~ claims 1 ~~to 7~~, in which the catalyst of step a) comprises a total concentration of oxides of metals from groups VIB and VIII in the range of about 5% to 40% by weight, with a ratio between the metal (or metals) from group VI and the metal (or metals) from group VIII, expressed as the metal oxides, of about 20 to 1 by weight.

9. A process according to ~~any one of~~ claims 2 ~~to 8,~~ in which the zeolite for the catalyst for step d) is an acid zeolite HY characterized by a SiO_2/Al_2O_3 mole ratio in the range about 8 to 70; a sodium content which is less than about 0.15% by weight, determined using the zeolite cal~~ined~~cined at 1100°C; a lattice parameter *a* of the unit cell in the range about 24.55×10^{-10} metres (m) to $24.24\ 10^{-10}$ m; a sodium ion take-up capacity C_{Na}, expressed as grams (g) of sodium per 100 g of modified zeolite, neutralised then calcined, of more than about 0.85; a specific surface area, determined by the BET method, of more than about 400 m^2/g (square metres per gram); a water vapour adsorption capacity at 25°C at a partial pressure of 2.6 torrs (i.e., 346.63 Pa) of more than about 6% by weight, a pore distribution with in the range about 1% to 20% of the pore volume contained in pores with a diameter located between about 20×10^{-10} metres and 80×10^{-10} metres, the remainder of the pore volume being contained in pores with a diameter of less than 20×10^{-10} metres, and a zeolite mass in the range 2% to 80% with respect to the catalyst used in step d).

10. A process according to ~~any one of~~ claims 2 ~~to 9~~, in which the matrix of the catalyst for step d) is selected from the group ~~formed by~~ consisting of alumina, silica, silica-alumina, alumina-boron oxide, magnesia, silica-magnesia, zirconia, titanium oxide and clay, these compounds being used alone or as a mixture.

11. A process according to ~~any one of~~ claim~~s~~ 2 ~~to 10~~, in which the catalyst for step d) comprises a total concentration of oxides of metals from groups VIB and VIII in the range from about 1% to 40% by weight, the ratio between the group VI metal (or metals) and the group VIII metal (or metals), expressed as the metal oxides, being in the range about 20 to 1.25 by weight, and the concentration of phosphorous oxides being less than about 15% by weight.

12. A process according to ~~any one of~~ claim~~s~~ 2 ~~1 to 11~~, in which step a) and step d) of the process are carried out at an absolute pressure in the range about 2 to 35 MPa, a temperature in the range about 300°C to 550°C, a hourly space velocity in the range about 0.01 to 10 h^{-1}, in the presence of hydrogen, the H_2/HC ratio being in the range about 50 to 5000 Nm^3/m^3, the conditions for these two steps being identical or different.

13. A process according to ~~any one of~~ claim~~s~~ 1 ~~to 12~~, in which step c) of the process is carried out in at least one thermal diffusion column with a height in the range about 0.5 to 30 metres (m), comprising two tubes placed one inside the other, the oily residue circulating in the space formed by said two tubes, the space between said two tubes being in the range from about 1 millimetre (mm) to 20 centimetres (cm); the temperature difference between the wall of the internal tube and the wall of the external tube being in the range about 25°C to 300°C, the wall of the internal tube being kept at a temperature which is less than that of the wall of the external tube.

add C1

add B4

add C5